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COMPLETE SPECIFICATION.

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An Improved Inhaler.

I, EMIL FAHR, Secretary at the German Government Board of Health of Berlin, N., Boyenstr 33, do hereby declare the nature of my said invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

5 This Invention relates to that class of apparatus (which are known as Inhalers) used for conveying medicament into the human body by inhaling.

According to the researches of Valentin & Krieger it is shown that air inhaled at a temperature of  $-10^{\circ}\text{C}$  and air of  $+20^{\circ}\text{C}$  are exhaled at a temperature of  $+30^{\circ}\text{C}$  &  $39.9^{\circ}\text{C}$  respectively without regard to the moisture contained therein,  
10 but when expelled are completely saturated with moisture. The tension of the air at the sea level according to Hoppe and others at a temperature of  $+20^{\circ}\text{C}$  amounts to about 17.39 millimetres mercury and at a temperature of  $+36.9^{\circ}\text{C}$  to 46.44. millimetres.

When air completely saturated with steam is breathed into the respiration organs  
15 of a person having a temperature lower than that of the respiration organs which have a temperature of about  $37^{\circ}$  some of the moisture contained in the air will be extracted.

In order to convey evaporated medicament into the human body by inhaling, and to deposit the same therein, it must be mixed with air of a temperature higher than  
20 that of the human body, namely over  $37^{\circ}\text{C}$  the air must be completely saturated with vapour and so inhaled.

In order to carry out the above system I use the apparatus shown in the accompanying Drawing, in which

Figure 1 is a side view of an inhaling apparatus according to this Invention.  
25 Figure 2 a top view. Figure 3 a vertical cross section through the line X X Figure 2 and Figure 4 is a horizontal cross section of the same.

An apparatus according to my Invention consists of a round, or oval boiler *a* in which is placed the round, or oval mixing vessel *b*, which is formed that it stands at a certain distance from the side wall of the boiler *a*. The space between the two  
30 boiler *a* and vessel *b* is closed at the top but can be filled with water through the aperture *a*<sup>1</sup> in the top and run off at the cock *a*<sup>2</sup>.

The water is warmed to a temperature of  $50^{\circ}\text{C}$  by means of the gas burner *c*, or other suitable means under the boiler *a*. Between the bottom of the inner vessel *b*



*Fahr's Improved Inhaler.*

and the boiler *a* a bent tube, or pipe *d* is placed, one end of which passes out through the shell of the boiler *a* at *d*<sup>1</sup>, while the other end is led into the vessel *b* at *d*<sup>2</sup>. Opposite the opening *d*<sup>2</sup> is a branch *b*<sup>2</sup> let into the side of the vessel *b*, the vessel *b* has a hinged cover or lid. The pipe *b*<sup>2</sup> is for conducting the air (which is warmed in the vessel *b*) to the patient through the tube *h*. The pipe *b*<sup>2</sup> passes through a pipe *a*<sup>3</sup> 5 in the boiler *a*, between which there is an annular space. This space is kept warm being in communication with the water in the boiler *a*, in this way the air is warmed which is drawn from the vessel *b*. On the boiler *a* there are two sprays *e*, *e*, of usual and known construction, the cistern *e*<sup>1</sup> of which are heated by gas, or a spirit flame. The safety valves of these cisterns are led into the boiler *a*, the mouth pieces of the 10 sprays are conducted into the vessel *b* and lie over the suction pipes *e*<sup>2</sup>. The suction pipes *e*<sup>2</sup> are led into the well *v* in the vessel *b*. The well *v* is filled with the medium (which it is desired to inhale) through the openings *b*<sup>3</sup> in the cover and after use run off again by the pipe *r* and cock *r*<sup>1</sup>. Medicament which has been evaporated in another apparatus can also be led into the vessel *b* through the opening *b*<sup>3</sup>. 15

In order to ascertain the temperature and moisture of the air at any moment and so adjust the burners under the boiler *a* and the cisterns *e*<sup>1</sup>, the vessel *b* is provided with two thermometers *f* *f*<sup>1</sup>. The thermometer *f* tells the temperature of the air and the thermometer *f*<sup>1</sup> whose bulb is surrounded with gauge and rests in the box *g* which contains water and so keeps continually moist according to the moisture of the 20 air and steam and so the moisture of the mixture can be ascertained.

In order that the thermometer *f*<sup>1</sup> should register correctly there is a small fan *i* in the vessel *b* which is driven by clockwork *i*<sup>1</sup> on the cover (Figures 1 and 2) which brings the air in contact with the bulb of the thermometer *f*<sup>1</sup>.

The working of the apparatus is as follows:—On the pipe *b*<sup>2</sup> is fastened an india 25 rubber tube *h*, the free end of which the patient places in his mouth. The patient draws at each breath a portion of the air in from the vessel *b* which is replaced by dried air from the spiral tube *d* which enters at *d*<sup>1</sup> from the outside and passes at *d*<sup>2</sup> into the vessel *b* while the two sprays work continually and thus keep the entering air moist with and charged with the medicament. 30

The air entering the tube *d* can be passed through a holder *k* containing chloride of calcium when it is desirable, or necessary to filter it from moisture and warmth and to clear it.

In the case that only gaseous medicament is used, then only is vapour added to the same in the vessel *b* by the spray pipes *e* *e*. 35

Having now particularly described and ascertained the nature of my said Invention and in what manner the same is to be performed, I declare that what I claim is:—

First. Apparatus for inhaling purposes constructed and operating as, or substantially as set forth. 40

Second. In apparatus of the type herein described, a water boiler and a mixing vessel in combination with a spraying device, a delivery pipe and an air inlet pipe, the parts being arranged in such a manner that air enters the air supply pipe, is warmed therein, and passes into the mixing vessel, wherein it is saturated with vapour of water and the desired medicament, and finally drawn off through the delivery 45 pipe, substantially as and for the purposes described.

Dated this 22nd day of May 1888.

EMIL FAHR.

By Cheesbrough & Royston,  
Agents.

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